OUR BOOKSHELF.

Das Pflanzenreich. Herausgegeben von A. Engler. Heft 48 (iv., 23C), Araceæ-Lasioideæ. By A. Engler. Pp. 130. Price 6.60 marks. Heft 49 (iv., 101, Nachträge), Monimiaceæ (Nachträge). By J. Perkins. Pp. 67. Price 3.60 marks. Heft 50 (iv., 50, ii. B. 21), Orchidaceæ-Monandræ-Dendrobiinæ. Pars ii. Genera n. 278–279, and (iv., 50, ii. B. 23) Orchidaceæ-Monandræ—Thelasinæ. Genera 280 and 280A. By Fr. Kränzlin. Pp. 182+46. Price 11.60 marks. (Leipzig: W. Engelmann, 1911.)

THE subfamily Lasioideæ includes Amorphophallus, Rhektophyllum, a West African climber, Montrichardia, an arborescent form, and many tuberous-stemmed plants such as *Thomsonia nepalensis*; vegetative shoots or bulbils are normally developed from such tubers, being produced in great profusion by *Dracontium asperum.* Entire sagittate leaves are not uncommon, but a much divided leaf with sagittate outline is more typical. The spadix is exceedingly variable in form; in the case of *Amorphophallus rex* it bears a peculiar appendage and a singular spathe. The various phylogenetic relationships of the various genera are discussed at length. Cytospermum is regarded as the most primitive on account of its perigoniate hermaphrodite flower, the presence of endosperm in the seed and its pantropic distribution; the genera Nephthylis and Montrichardia are placed at the other end of the scale by reason of their naked unisexual flowers and poral dehiscence of the anthers.

The supplement to the early volume on the Monimiaceæ contains the additions that have accumulated in ten years. A compliment is paid to a well-known benefactor by the establishment of a new genus Carnegiea, although the association with a type specimen from New Caledonia is not immediately obvious. Two new myrmecophilous plants are noted in *Steganthera insignis* and *S. torricelliensis.*

The fiftieth part is principally a monograph of the genus Eria, in which the author follows Lindley except in the separation of the subgenus Trichotosia; with these two, Porpax is closely associated, but Phreatia is removed from the Dendrobiinæ to a new combination with Thelasis.

Primitive Animals. By Geoffrey Smith. Pp. x+156. (Cambridge: University Press, 1911.) Price 1*s.* net.

IN this book the author gives a concise account of the principal characters of a number of primitive animals, and of the arguments based upon their study. He first shows the great antiquity of the chief phyla by instancing the fact that in the oldest fossil-bearing rocks (Cambrian) there are representatives of certain families of Crustacea (Nebaliidæ, Cypridæ) which exist at the present day. In considering the lowest forms of life, the author points out that animals depend ultimately for their food upon plants, and suggests that "the presence of chlorophyll was the necessary precursor of life," but concludes that the problem of the origin of life is not within range of solution. Special attention is devoted to the Appendiculata, and particularly to Peripatus as a connecting link between Annelids and Arthropods. The structure of Nebalia and Anaspides is discussed in reference to the light it throws on the course of crustacean evolution. The chief characters of several invertebrate larval forms are considered in regard to their bearing on the relationships of certain phyla to one another; in this connection Mr. Smith maintains that, although certain larval forms, *e.g.* the trochosphere and the nauplius, may be ancient, they are not to be regarded as representing the ancestral form of the phyla to which they belong.

The annelid theory of vertebrate descent is discussed, and the difficulty of reconciling this view with the conditions present in Balanoglossus is pointed out, the origin of vertebrates being relegated by the author to the category of unsolved problems. Among other subjects treated in an interesting manner are the derivation of lungs from the air-bladder of Dipnoi, the rise of the mammals, and the degeneracy of marsupials. The volume brings into prominence the special features which have been found to throw light on phylogenetic problems, and is a good introduction to the mode of application of the comparative method in morphology, and to some of the principal results obtained.

Micropetrology for Beginners. An Introduction to the Use of the Microscope in the Examination of Thin Sections of Igneous Rocks. By J. E. Wynfield Rhodes. With a preface by C. H. Sidebotham. Pp. xv+126. (London: Longmans, Green and Co., 1912.) Price 2*s.* 6*d.* net.

THE object of this work, as stated by its author, is to supply teachers in evening technical schools, and others, with practical information on the use of the petrological microscope—so far at least as is necessary in the instruction of students in geology for the Intermediate B.Sc. of the London University. It is disappointing to find that a work of this kind is considered to be necessary, for it might fairly be hoped that teachers, undertaking the preparation of candidates for university degrees, would themselves have the necessary practical knowledge for the guidance of their students in manipulation—seeing that an ounce of *showing* is worth a pound of *telling.*

So far as is possible in work of this kind, the practical directions given in the book are clear, and anticipate many of the difficulties that may arise. The weakest portion of the book is the second chapter, in which an attempt is made, in a few pages, to deal with the question of the optical properties of minerals. In the aim at condensation many unexplained terms are employed, and not a few statements are made which are open to serious criticism. Much more successful is the latter portion of the book, in which a number of rock-sections are described and illustrated; but as the selection of rocks is confined to

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those of igneous origin, many important rock-forming minerals, like the garnets, are not among those figured. The preface of the book suggests that it is not intended to take the place of an ordinary text-book, but to supply the information which is not given in such works, being left for the laboratory-demonstrator to supply—and this would seem to be the limit of the book's usefulness.

Famous Chemists. By E. Roberts. Pp. 247. (London: G. Allen and Co., Ltd., 1911.) Price 2*s.* 6*d.*

IT seems a little difficult to understand the object of writing a series of disconnected short biographies of distinguished chemists now that we have several readable histories of chemistry of moderate compass in which biography is woven into connected narrative. At the same time it must be stated, after conscientiously reading the book from cover to cover, that these biographical epitomes are well done. The chief contributions of each master are clearly indicated, and the human touches on the whole artistically added. Boyle hardly has his due proportion, and Berthelot and van't Hoff are not included at all.

Perhaps the chief thing to be said for this compact gallery of chemists is that it may help to stimulate an interest in history, and lead the reader to a more thorough study of the life-work of the great men who have made chemistry what it is. This is an educational and liberalising side of chemical study which in the past has been much neglected. It is a pure convention, and a mischievous one, that isolates the study of natural philosophy itself from the study of its history.

A. S.

Earth and her Children. By Herbert M. Livens. Pp. 248. (London: T. Fisher Unwin, 1912.) Price 5*s.* net.

MR. LIVENS practises the art of teaching nature study by means of pleasant little stories in which plants and animals speak autobiographically. The nature knowledge imparted in the twenty-four chapters into which the book is divided is much diluted by the conversational matter introduced, but the stories will please many children, and may lead a few to observe nature for themselves.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

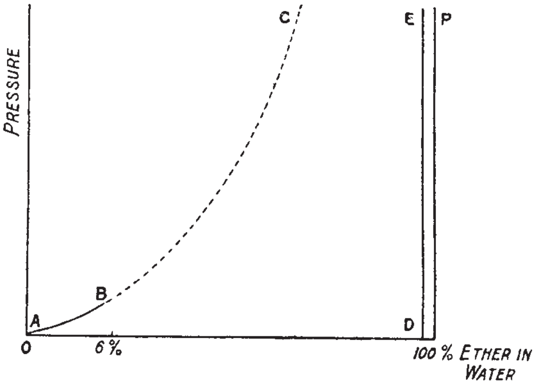
Osmotic and Liquid Membranes.

IN an interesting letter in NATURE of February 22 Lord Berkeley has considered the question of a possible osmotic cycle in which a liquid such as ether is placed at the same time in connection through membranes with an aqueous solution of sugar and with water, while the latter is also in similar connection with the solution.

The water is kept at zero pressure, while the ether and the solution are at the osmotic pressure of the latter.

As a consequence of a view of osmotic membranes which I have lately ventured to put forward in a paper in the Proc. Roy. Soc., he quite correctly deduces that equilibrium should exist for different strengths of the sugar solution provided the pressure is its osmotic pressure, and in addition that the ether should hold the same amount of water in solution at the different pressures. Or, to quote his words, "the same solution of water in ether has two different osmotic pressures." This he regards as impossible.

Perhaps the best way to consider this question is to examine first the simple case of water placed on either side of a membrane permeable to water, but not to ether, and to suppose ether gradually added to one side. The osmotic pressure will rise, as shown by AB, to a maximum value at about 6 per cent. of ether. No solution of greater strength than this is possible until we reach 98·95 per cent. The osmotic pressure is now again zero, but rapidly rises, as shown along DE, approaching the pressure axis P asymptotically; so that practically without any concentration change we can have any osmotic pressure we please.



The dotted curve has been added to show the normal character of the curve for substances which dissolve in all proportions, and probably if the pressure on both sides of our membrane were raised to a sufficiently high value the two portions of the ether curve would unite somewhat after the fashion of the Van der Waals's isothermals, and ultimately form the normal case, because experiments (not yet published) show that the portion DE moves to the left under pressure.

If the above experiment be supposed repeated, but with sugar in solution on the other side of the membrane to that to which the ether is added, the first possible *strong* solution of ether is greater than 98·95 per cent., or DE is moved to the right. As in the case of water, so in the case of sugar solution, DE can be moved to the left by raising the pressure on both sides of the membrane. For a 60 per cent. solution of sugar the pressure to bring it back to its old position is 80 atmospheres.

Returning now to Lord Berkeley's cycle, we are in a position to see how equilibrium can exist without an appreciable change in strength of the ether solution when different strengths of the sugar solution are used. Referring to his figure, equilibrium exists across membrane *bd* at the osmotic pressure of the solution when the concentration of the ether is 98·95 per cent., and practically the same concentration is required for equilibrium at the membrane *bc*, no matter what the pressure may be.

Perhaps I may add that the view of osmotic membranes which I wished in my paper to emphasise is that a substance which acts as ether does in the condition at DE can, so long as the mechanical strength

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